REMARKS

In light of the foregoing Amendments and following Remarks, reconsideration and allowance of the above-captioned application are respectfully requested.

The Applicants and their representative would like to thank Examiner Stouffer and Examiner Meeks for the time and courtesy extended during a telephone interview with the undersigned Thursday, September 21, 2006. During the interview, the presently presented claim amendments were discussed. The Examiners stated that the presently presented claim amendments appear to differentiate the pending claims over the cited art.

Claims 1-37 are currently pending in the application, including independent claims 1, 15, 22, and 30. For instance, pending claim 1 is directed to a process for forming a nanostructure. The process includes providing a metal to a reaction chamber as a metal layer formed on a surface and heating the reaction chamber to a reaction temperature such that the metal layer becomes molten. In particular, the reaction temperature in the process of claim 1 will be between 650°C and about 1500°C. The process also includes flowing a vapor stream comprising a reactant through the reaction chamber, reacting the reactant with the metal via a thermal CVD process to form a reaction product that includes the reactant and the metal, and forming a nanowire or a nanobelt that includes this reaction product.

In the Office Action, claims 1-37 were rejected under 35 U.S.C. 102(e) as being anticipated by Majumdar, et al. (U.S. Patent Application Publication No. 2002/0172820). Applicants respectfully submit that the presently pending claims patentably define over the cited reference for at least the reason that Majumdar, et al. fails to disclose or suggest certain limitations of the pending claims.

Majumdar, et al. is directed to nanostructures that can be formed according to a modified VLS procedure in which the catalyst size is arrested. Specifically, catalytic liquid nanoclusters are patterned on a substrate and during formation, each droplet acts as the catalyst for an individual nanowire. The metal of the patterned droplet of Majumdar, et al. is utilized solely as a catalyst during the formation process. As discussed in Majumdar, et al., for instance in paragraphs 90-94, the reactants are

provided as gaseous reactants that dissolve in the nano-sized catalytic liquid followed by growth of the nanowhiskers. The nanowires and heterostructure nanowires of Majumdar, et al. are formed from the gaseous reactants that dissolve in the metal catalyst. For instance, Example 1 of Majumdar, et al. discloses that catalyst gold nanoclusters form a liquid alloy with the gaseous silicon reactant. Growth of the *silicon* nanowire is initiated upon supersaturation of the gold catalyst by the silicon.

In contrast, the presently claimed process provides a metal *reactant* to a reaction chamber as a metal layer formed on a surface. A second reactant is provided to the process in a vapor stream. A thermal CVD reaction between the two forms a reaction product that includes *both* the metal from the metal layer and the second reactant.

For at least these reasons, Applicants respectfully maintain that claims 1-37 patentably define over Majumdar, et al.

In the Office Action, claims 1-10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sharma, et al. (U.S. Patent Application Publication 2003/0039602).

Sharma, et al. discloses a low temperature plasma enhanced CVD synthesis technique for growing semiconductor nanowires.

The processes of pending claims 1-10, in contrast, utilize *only* a thermal CVD processes that takes place at higher temperatures than does the process disclosed by Sharma, et al. For instance, the thermal processes of claims 1-10 are carried out at a temperature of between 650°C and about 1500°C.

Sharma, et al. discusses the benefits of the low temperature formation processes (see, e.g., paragraph 50 and 51), and states explicitly that very low temperatures are *required* when gallium is the melt (paragraph 50). Accordingly, Applicants respectfully submit that no proper incentive exists for modifying the reference as suggested to arrive at the thermal CVD processes of claims 1-10 and Applicants maintain that claims 1-10 patentably define over Sharma, et al.

In the Office Action, claims 11-37 were rejected under 35 U.S.C. §103(a) as being unpatentable over Sharma, et al. in view of Majumdar, et al.

Applicants respectfully submit that the pending claims patentably define over the cited references for at least the reason that the cited references cannot be properly combined as suggested.

As discussed above, Sharma, et al. is directed to a low temperature, plasma enhanced CVD nanostructure formation process. Moreover, the teachings of Sharma, et al. disclose that the low temperature formation processes are not only preferred over high temperature processes but are required, specifically when gallium is the melt.

Majumdar, et al., in contrast, is a high temperature modified VLS method in which the liquid catalyst is patterned on the substrate as nano-sized clusters and the reactants are gaseous. Not only do the references utilize different formation processes, but the process temperatures of Majumdar, et al. are much higher than those of Sharma, et al. For instance, with regard to Example 1 of Majumdar, et al., the CVD process is preferably carried out at approximately 600°C to approximately 800°C. Other examples of Majumdar, et al. take place at even higher temperatures (Example 4 - 850°C to 950°C; Example 7 - 880°C to 905°C). Accordingly, Majumdar, et al. utilizes a different methodology that is carried out at higher temperatures than Sharma, et al.

Applicants submit that no proper incentive exists for the suggested combination for at least the reason that the references teach away from such a combination. For example, Sharma, et al. discloses that the low-temperature plasma-mediated CVD technique is an improvement over methods that require creation of quantum sized liquid metal droplets to synthesize nanowires. In addition, Sharma, et al. offers advantages such as lower growth temperature, better control over size and size distribution, better control over the composition and purity of the nanowires. Accordingly, Applicants submit that Sharma, et al. teaches away from a combination with high temperature VLS processes requiring formation of quantum-sized droplets of materials such as is disclosed by Majumdar, et al.

In addition, Applicants submit that Majumdar, et al. also teaches away from such a combination. For example, according to Majumdar, et al., the disclosed high temperatures are necessary for the formation process to proceed, as discussed above, and as such, the teachings of this reference are directed away from lower temperature

ranges and any combination with lower temperature processes such as those of Sharma, et al.

Applicants submit that the references teach away from the suggested combination, and there exists no proper motivation to combine the references as suggested. As such, Applicants further submit that pending claims 11-37 patentably define over the cited references and request allowance of the claims.

It is believed that the present application is in complete condition for allowance and favorable action, therefore, is respectfully requested. Examiner Stouffer is invited and encouraged to telephone the undersigned, however, if any issues remain after consideration of this response.

Please charge any additional fees required by this Amendment to Deposit Account No. 04-1403.

Respectfully submitted,

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9/27/06
Date

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